| Centre Number | Candidate Number |
|---|---|
| | |

Candidate Name _____

**International General Certificate of Secondary Education**
**UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE**

# PHYSICS 0625/2

PAPER 2

Monday **24 MAY 1999** Afternoon 1 hour

Candidates answer on the question paper.
Additional materials:
Electronic calculator and/or Mathematical tables

**TIME** 1 hour

**INSTRUCTIONS TO CANDIDATES**

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets [ ] at the end of each question or part question.
You may lose marks if you do not show your working or if you do not use appropriate units.
Take the weight of 1 kg to be 10 N (i.e. acceleration of free fall = 10 m/s$^2$).

| FOR EXAMINER'S USE |
|---|
| |

**This question paper consists of 15 printed pages and 1 blank page.**

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**[Turn over**

**1** An insect lands on a 30 cm ruler and walks along the edge, as shown in Fig. 1.1.

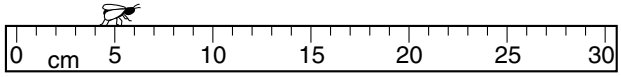


**Fig. 1.1**

A child measures the time the insect takes to walk from the 5 cm mark to the 25 cm mark. It takes 50 s to do this.

What is the average speed, in cm/s, of the insect?

speed = ..... [3]

**2** **(a)** A uniform beam AB of weight $W$ is balanced at its midpoint on a pivot. Two weights $W_1$ and $W_2$ are then hung at equal distances from the midpoint of the beam.

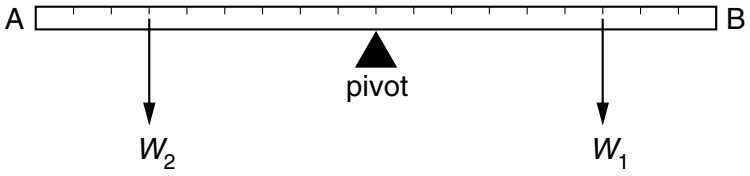


**Fig. 2.1**

When this is done, the end B moves down.

**(i)** Which is the heavier weight?

.....

**(ii)** Which way would $W_1$ have to be moved so that the beam is again balanced?

.....
[2]

**(b)** $W_2$ is removed from the beam. This means that the only forces acting downwards on the beam are the weight $W$ of the beam and $W_1$.

$W$ is much greater than $W_1$.

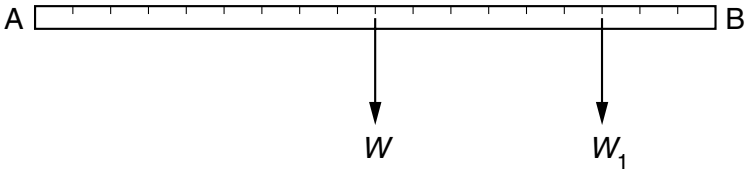


**Fig. 2.2**

On Fig. 2.2, mark a possible position for the pivot to be placed so that the beam is again balanced. [2]

**3** **(a)** How does the separation of the molecules of substance X in the solid state compare with the separation when substance X is in the gaseous state? Tick one box.

molecules further apart in the solid state ☐

molecules further apart in the gaseous state ☐

molecules same distance apart in both cases ☐ [1]

**(b)** State how the molecules of substance X move in the solid state and in the gaseous state.

solid state .....

gaseous state ..... [2]

**4** Here are some statements about energy. Complete the statements using words from the following list.

**chemical, electrical, geothermal, heat, hydroelectric, light,**

**movement (kinetic), position (potential), strain, tidal, wave**

**(a)** A coal fire converts ..... energy into

..... energy and ..... energy. [3]

**(b)** When a ball falls from rest, its ..... energy increases

and its ..... energy decreases. [2]

**(c)** The source of energy, in which hot rocks under the Earth's surface heat water

to produce steam, is referred to as ..... energy. [1]

**5** **(a)** On Fig. 5.1, sketch the graph you would expect to get if you plotted values of the potential difference *V* across a metallic conductor at constant temperature and the current *I* through it.

[2]

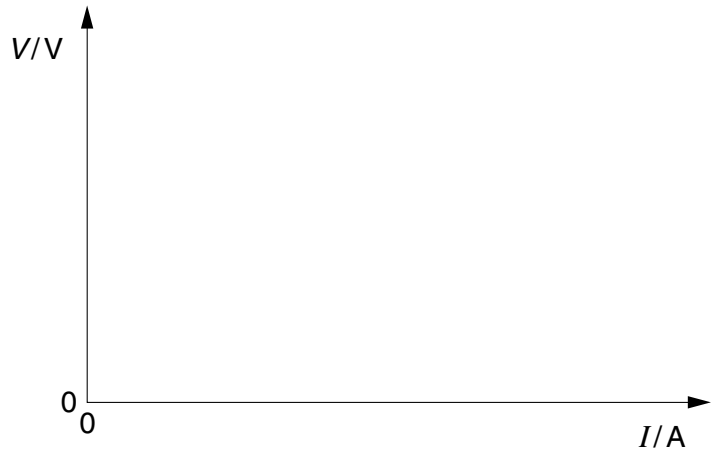


**Fig. 5.1**

**(b)** How would you use the graph to find the resistance of the conductor?

.....

.....

..... [1]



[Turn over

**6** A narrow beam of white light passes through a glass prism and is split into a band of colours, which is seen on a screen AB. This is illustrated in Fig. 6.1.

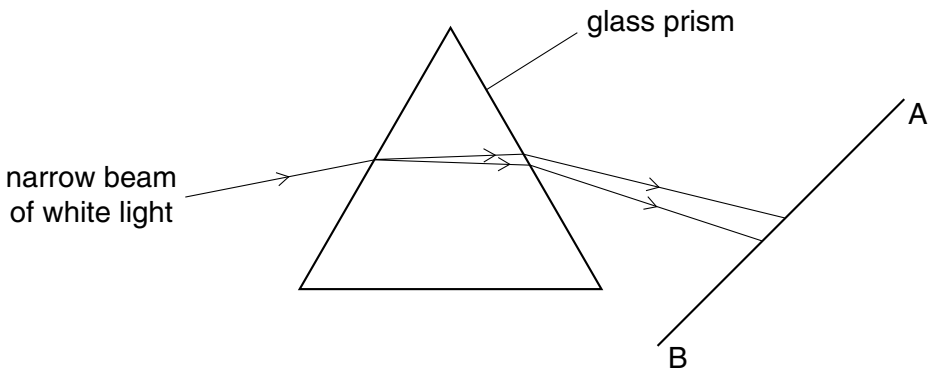


**Fig. 6.1**

**(a)** What name do we give to the process by which the white light is split up into colours?

..... [1]

**(b)** What name do we give to the band of colours seen on the screen?

..... [1]

**(c)** What colour is seen at the edge of the band of colours closer to A?

..... [1]

**(d)** A thin sheet of clear red plastic is put in the path of the light before the light reaches the prism. What is now seen on the screen?

..... [1]

**7** A student wraps a length of fine wire around a wood block and hangs the block between the poles of a magnet, as shown in Fig. 7.1.

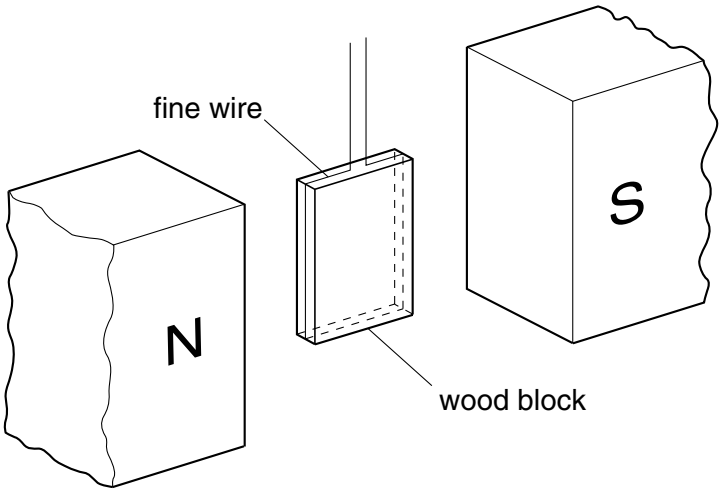


**Fig. 7.1**

**(a)** What is seen to happen when the student passes a current through the fine wire?

..... [1]

**(b)** Why does this happen?

.....

..... [2]

**(c)** Name a device which makes use of this effect.

..... [1]

**8** State one safety reason why

**(a)** radioactive sources should not be touched with bare hands,

..... [1]

**(b)** radioactive sources emitting $\gamma$-rays should be stored in lead boxes with thick sides,

..... [1]

**(c)** the radiation symbol should be displayed on the cupboard or drawer in which radioactive materials are kept.

..... [1]

**9** In a factory which makes paper, the sheets are packed in piles of 500. One pile (of 500 sheets) has a mass of 2.4 kg, and is 0.05 m thick. The sheets measure 0.3 m x 0.2 m. The pile is illustrated in Fig. 9.1.

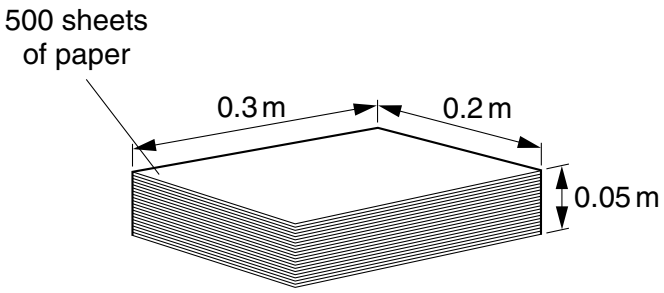


**Fig. 9.1**

**(a)** Calculate

**(i)** the volume of the pile of 500 sheets,

volume = .....

**(ii)** the density of the paper.

density = .....
[6]

**(b)** An object of mass 1 kg has a weight of 10 N. Calculate the weight of one pile of paper.

weight = ..... [1]

**(c)** The pressure exerted by the pile of paper when it is on a table is given by

$$\text{pressure} = \frac{\text{force}}{\text{area}} .$$

Calculate this pressure.

pressure = ..... [4]

**(d)** Another pile of the same paper contains only 250 sheets.

**(i)** How does the mass of this pile compare with that of the first pile?

.....

**(ii)** How does the density of the paper in this pile compare with that of paper in the first pile?

.....

**(iii)** How does the weight of this pile compare with that of the first pile?

.....

**(iv)** How does the pressure exerted by this pile compare with that of the first pile?

.....
[4]

**10** You are given a steel spring hanging from a support, a load and a 30 cm rule.

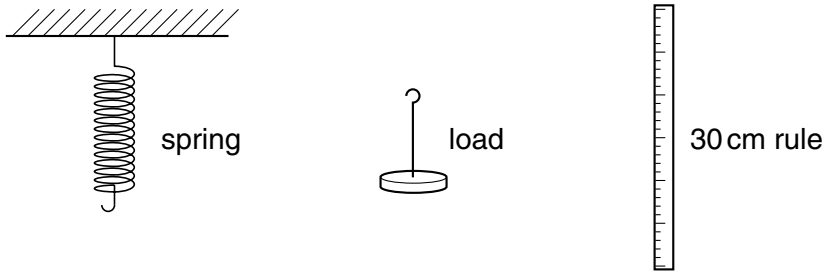


**Fig. 10.1**

**(a)** In the space below, describe carefully the steps you would take in order to measure the extension of the spring when the load is hanging on it. You may draw a diagram if this helps you to answer the question.

.....

.....

.....

.....

.....

.....

[5]

**(b)** You also have a range of other loads which you can hang on to the spring. Equal increases in load cause equal increases in length. Using the maximum load from this range, the spring returns to its original length when this load is removed. On Fig. 10.2, sketch the extension / load graph you would expect to obtain with the spring as the load is increased. Label this line "GRAPH 1". [2]

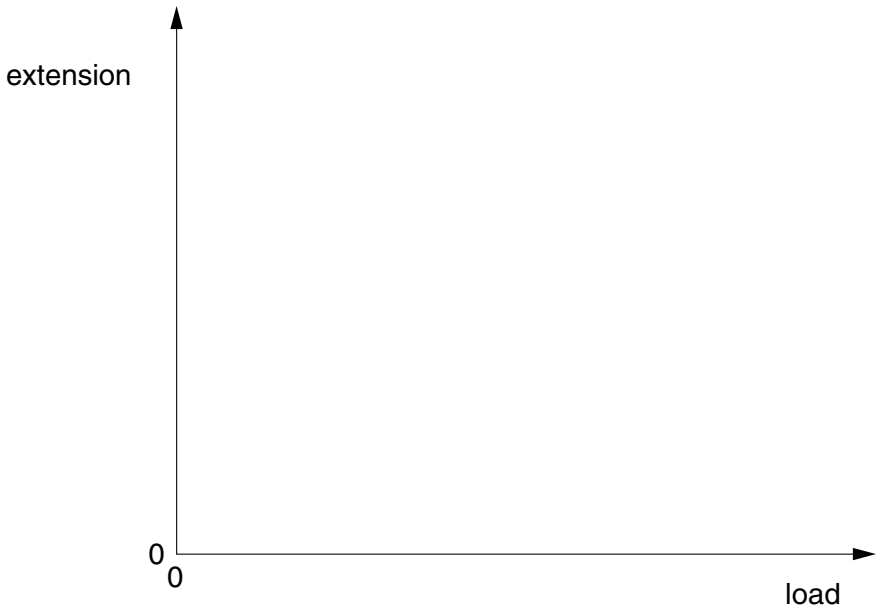


**Fig. 10.2**

**(c)** The first spring is replaced with a second spring and the experiment is repeated. The second spring does not stretch as much as the first spring when the same load is hung on it.

On Fig.10.2, sketch the graph you would expect to obtain.

Label this line "GRAPH 2". [1]

**(d)** A wooden trolley is placed on a horizontal bench.

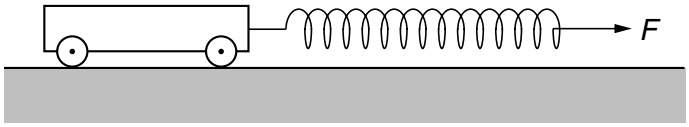


**Fig. 10.3**

The first spring is attached to the trolley, as shown in Fig.10.3.

**(i)** A force *F* keeps the spring slightly extended and the trolley moves. Describe the motion of the trolley.

.....

**(ii)** The first spring is replaced by the second spring, and the same force *F* stretches the spring. How does the motion of the trolley compare with your answer to **(d)(i)**? Explain your answer.

.....

.....

.....

[3]

**11 (a) (i)** Draw a clear diagram of a simple mercury barometer. [4]

Now fully label your diagram. [2]

**(ii)** State the physical quantity that can be determined by using a mercury barometer.

..... [1]

**(iii)** On your diagram in **(i)**, mark clearly, using the letter *h*, the length you would measure to determine the physical quantity named in **(ii)**. [2]

**(b)** Fig. 11.1 shows a manometer being used to measure the pressure of the gas in a container.

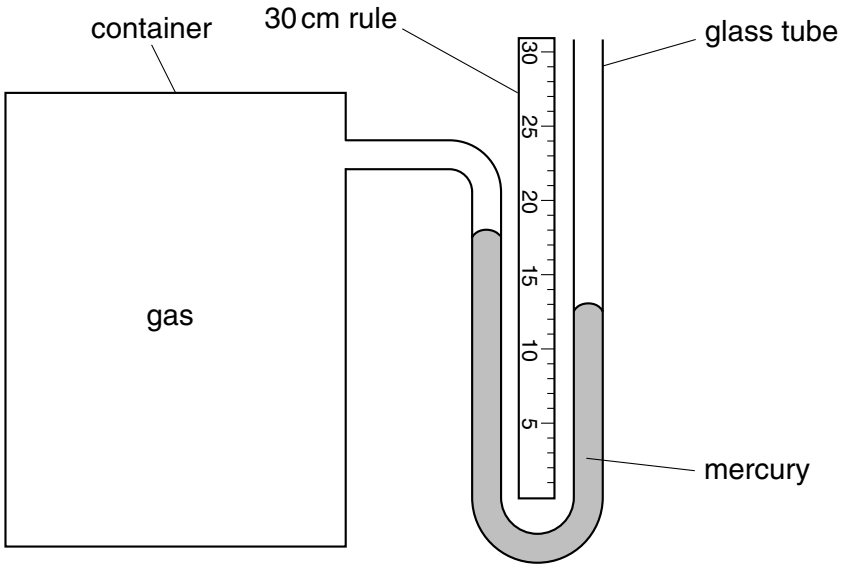


**Fig. 11.1**

**(i)** What is the difference in height of the two mercury levels?

..... cm [1]

**(ii)** What does the difference in height of the mercury levels indicate?

..... [1]

**(iii)** State whether the gas pressure is greater than or less than the atmospheric pressure and how you know this.

.....

..... [2]

**(iv)** What would happen to the two mercury levels if the gas pressure increased slightly?

.....

..... [1]

**(v)** The mercury manometer is replaced by another manometer that contains a liquid of lower density. How, if at all, does this affect the difference between the liquid levels?

..... [1]

**12 (a)** Fig. 12.1 illustrates a cathode-ray tube.

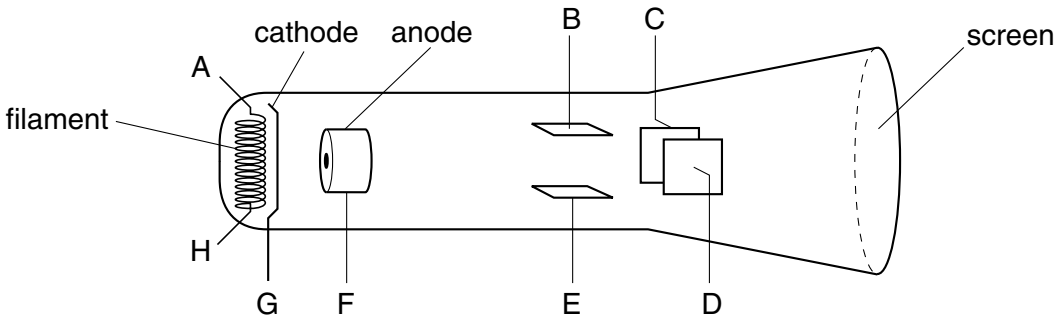


**Fig. 12.1**

**(i)** Between which two points would you connect a low potential difference in order to heat the cathode?

Between ..... and .....

**(ii)** Between which two points would you connect a high potential difference in order to produce cathode rays?

Between ..... and .....

**(iii)** Between which two points would you connect a potential difference in order to deflect the cathode rays upwards?

Between ..... and .....

[3]

**(b)** When the time base of a cathode-ray oscilloscope is turned on, there is a horizontal trace across the screen, as shown in Fig. 12.2.

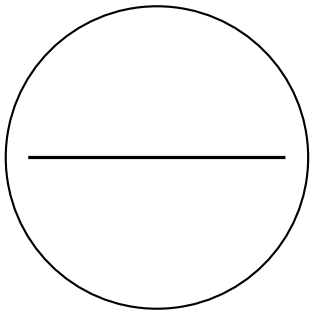

**Fig. 12.2**

**(i)** An alternating potential difference of constant frequency and constant amplitude is connected to the Y-input of the oscilloscope.

On Fig. 12.2, sketch the trace which might be obtained.

**(ii)** The time base is switched off but the alternating potential difference is left connected. **Describe** what would be seen on the screen.

.....

.....

[4]

**(c)** A microphone is connected to another cathode-ray oscilloscope, with the time base switched to a suitable setting. First, a lady with a high-pitched voice sings into the microphone. Then a man with a low-pitched voice sings into the microphone. Describe how the traces seen on the screen would differ.

.....

..... [2]

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